

REMARKS

This Amendment is responsive to the Office Action mailed on July 22, 2008. Claims 1, 3-10, and 12-18 are amended. Claims 1-18 are pending.

Claims 1-5, 7, 8, 10-14, 16, and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kliegis (US 5,769,078) in view of Horbal (US 5,240,581).

Claims 6, 9, 15 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kliegis in view of Horbal and Gerig (US 5,446,548).

Applicants respectfully traverse these rejections in view of the amended claims and the following comments.

Discussion of Amended Claims

Claims 1, 3-10, and 12-18 are amended herein for clarity and to overcome potential antecedent basis problems with the claim language.

Discussion of Section 103 Rejection

Claims 1-5, 7, 8, 10-14, 16, and 17 are rejected as being unpatentable over Kliegis in view of Horbal.

With Applicants' claimed invention, a navigation system is used for determining the position of a tool working on a piece of material and the position of the piece of material. During the working of the piece of material the position data are stored and used to determine the prepared contour on the piece of material using extreme values of the relative positions of the tool with respect to a reference position of the piece of material. This process can be done at any time during the working operation so that during the working of the piece of material the person moving the tool will always know, from the extreme values of the position of the tool, the contour that has so far been worked into the piece of material.

For obtaining of the extreme values it is necessary to store all the positions of the tool with respect to the piece of material during the working. The navigation system can then determine, from these stored values, which are the extreme values (i.e., the positions of the tool which are

closest to the piece of material, since such positions will correspond to the contour which the tool has to that point worked into the piece of material).

Kliegis in combination with Horbal does not disclose or remotely suggest such a method as claimed by Applicants in claim 1 or a device for carrying out such a method as claimed in claim 10.

Kliegis discloses a positioning appliance 2 with a manipulator arm 4 that has a receiver 12 into which a machining tool 16 can be inserted. In Kliegis, the tool 16 can be moved with respect to a piece of material 10 and the movement of the tool 16 is controlled by a computer 20 (Col. 3, lines 28-44).

The computer 20 of Kliegis has a memory, but this memory is only used for storing 3-D data which was produced prior to the operation by non-invasive examinations (Col. 3, lines 45 to 55). In addition, the position data of the tool with respect to the piece of material are not stored in the memory of the computer 20 of Kliegis, as is the case with Applicants' claimed invention.

In Kliegis, the tool 16 is controlled by the data stored in the memory of the computer 20 and the movement is therefore dependent on the three-dimensional structural image which has been determined prior to the surgery and which has been stored in the memory. Further, in Kliegis, the tool 16 is driven so as to work the piece of material according to the stored structural image. With Kliegis, the user does not know during the working operation the position of the actual contour on the piece of material until the working is terminated. After termination of the working, the contour reached on the piece of material is that which was previously stored in the memory of the computer 20. However, from the beginning of the working until the termination of the working, no information is given in Kliegis as to the progress of the contour reached on the piece of material.

With Applicants' claimed invention, the tool can be moved, for example by hand, and by storing the position data of the tool at any time it is possible to find out the contour produced by the tool at any time. In contrast, in Kliegis the movement of the tool 16 is not free, but rather the movement of the tool 16 is controlled by the computer according to the data stored in the memory that was obtained prior to the operation.

In addition, the Examiner acknowledges that Kliegis does not disclose determining the extreme values as claimed by Applicants in independent claims 1 and 10 or that marking elements are attached to the bone and the tool as claimed by Applicants in independent claim 10, and relies on Horbal for disclosing this subject matter.

Horbal discloses an optical sensor 32 comprising three sensing units each having a lens 36 oriented towards an operating table 28. Orthopaedic markers 42 are secured to a leg bone above and beneath the knee and each marker 44 carries an LED 44 which is sensed by the lens 36 of the sensing units. A computer 38 with graphics monitor 40 is provided (Col. 3, lines 4-34). The sensor 32 of Horbal is used to obtain position data on different bone parts. The position data can be compared prior to an operation and after the operation so that it is possible to check whether the position of the bone fragments after the operation is correct (Col. 5, lines 35-65).

Horbal is not at all related to a method or device that can be used for the supervision of the position of a working tool during the working operation in order to store all the intermediate positions in the memory and for determining from all of these stored values the extreme values of relative positions of the tool and the piece of material, which indicates the contour worked into the piece of material, as can be achieved with Applicants' claimed invention.

It is true that Horbal discloses that a cavity is surgically formed in the pelvis (Col. 5, lines 28-32), as indicated by the Examiner. However, the LED 44 is not fixed in the cavity and Horbal does not provide any positional information regarding any tool used to create this cavity. In fact, Horbal gives no details about how the cavity is formed. As shown in Figure 3 of Horbal, the LEDs 44 are fixed to the adjacent bones 70 and 72 (e.g., the tibia and fibia). In Horbal, the LEDs are used to show the relative position of the bones 70 and 72. Horbal expressly states that the fact that there is a joint in between the adjacent bones is immaterial since the principal purpose of Figure 3 is to show alignment of the bones. Accordingly, Applicants respectfully submit that the Examiner's assertions reliance on Horbal is misplaced.

Further, even if the features of Horbal are combined with Kliegis this would only result in markers being attached to the tool holder and the patient. However, this would not change the teaching of Kliegis, which is clearly only the control of the tool based on pre-operationally

obtained geometrical data, and would not provide the ability to check the actual contour worked into the piece of material during the whole working process.

In Horbal, only the final position of bone fragments is compared to the original position of the bone fragments. In contrast, with Applicants' claimed invention, it is possible to follow the working of the tool and thus the progress of the contour being created during the working process.

Applicants respectfully submit that the present invention would not have been obvious to one skilled in the art in view of Kliegis taken in combination with Horbal or any of the other prior art of record.

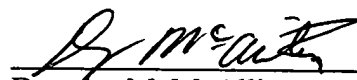
Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicants' silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections under 35 U.S.C. § 103(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,



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